COASTAL PLANNING & ENGINEERING, INC.

Beach Nourishment

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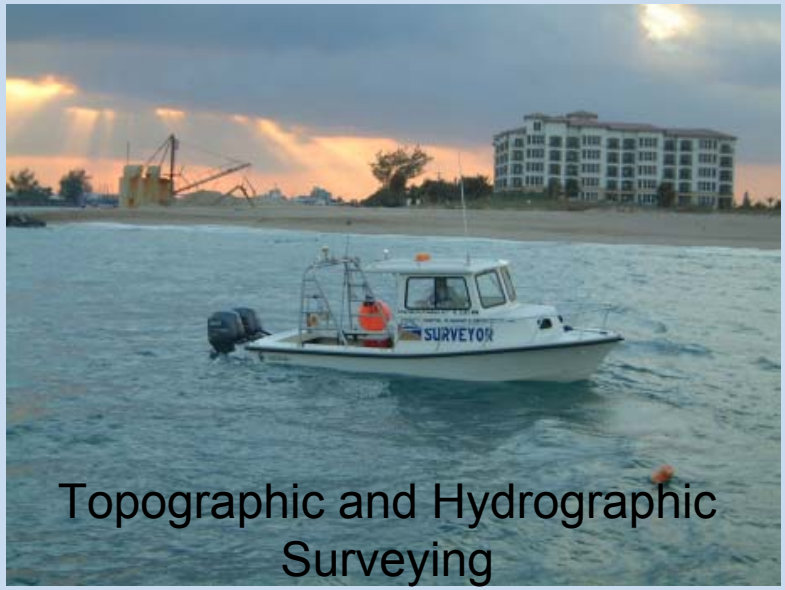
Senior Vice President
Coastal Planning & Engineering

April 10, 2006

Coastal Planning and Engineering

- Established in 1984
- Core Competencies:
  - Coastal engineering
  - Marine geology
  - Coastal and hydrographic surveying
  - Marine Environmental science
  - Regulatory approvals
- Staff Members Include:
  - Professional engineers, surveyors, coastal planners, environmental scientists, marine geologists, technicians, and support personnel



Topographic and Hydrographic Surveying


Sand Search

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What is Beach Nourishment?

- With time, sediment is moved from the beach by longshore drift or crossshore sediment transport
- Beach nourishment is a technique of placing sand fill along the shoreline to supplement sand on an existing beach or to build up an eroded beach.
- Beach nourishment provides:
  - A buffer against wave action,
  - A recreational area, and
  - An enhanced environmental zone

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What is Beach Nourishment?

The addition of sand to the beach through mechanical means

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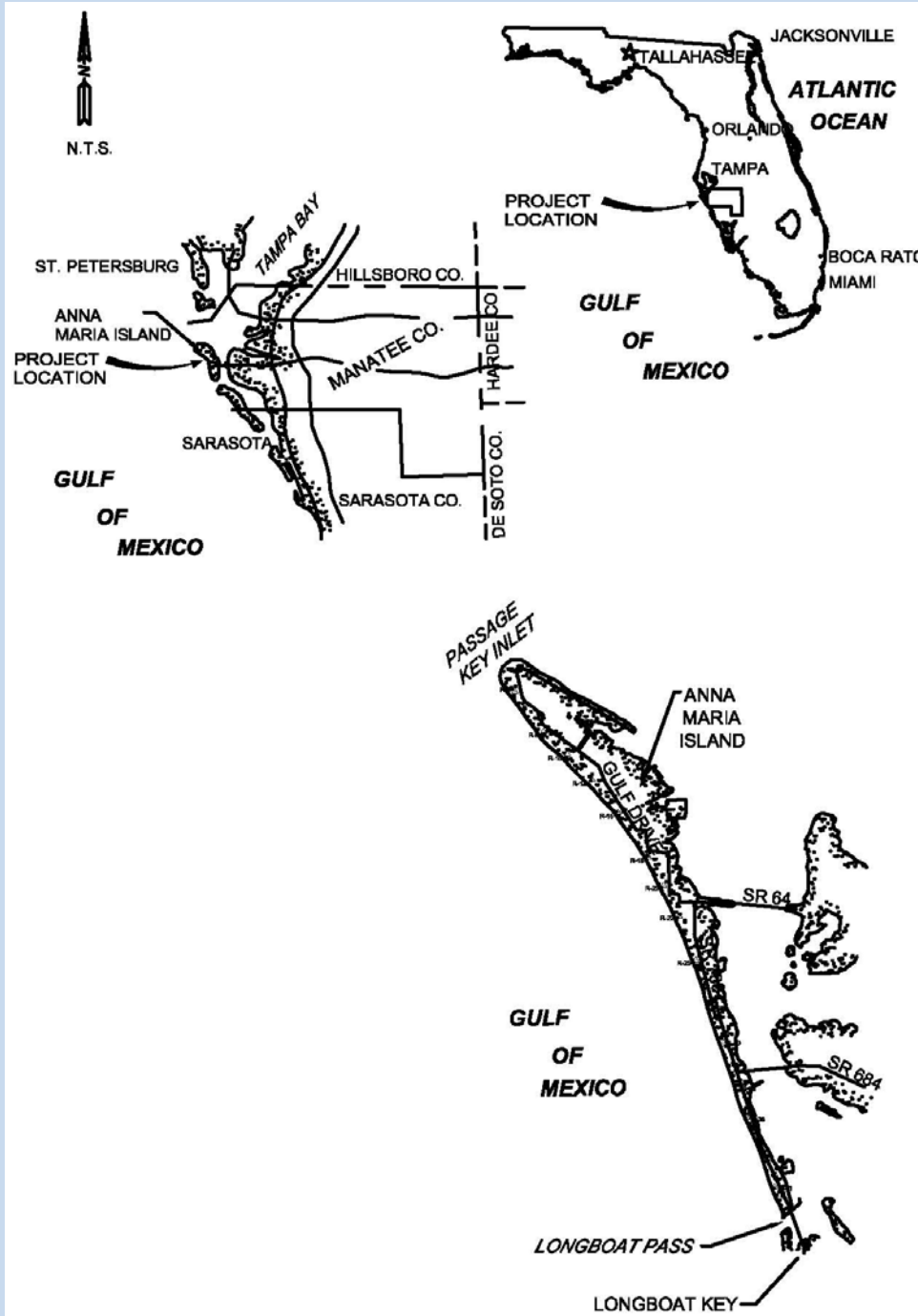
Beach Nourishment Project

Anna Maria Island Florida



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Anna Maria Island – Coastal Erosion

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Anna Maria Island – Coastal Erosion

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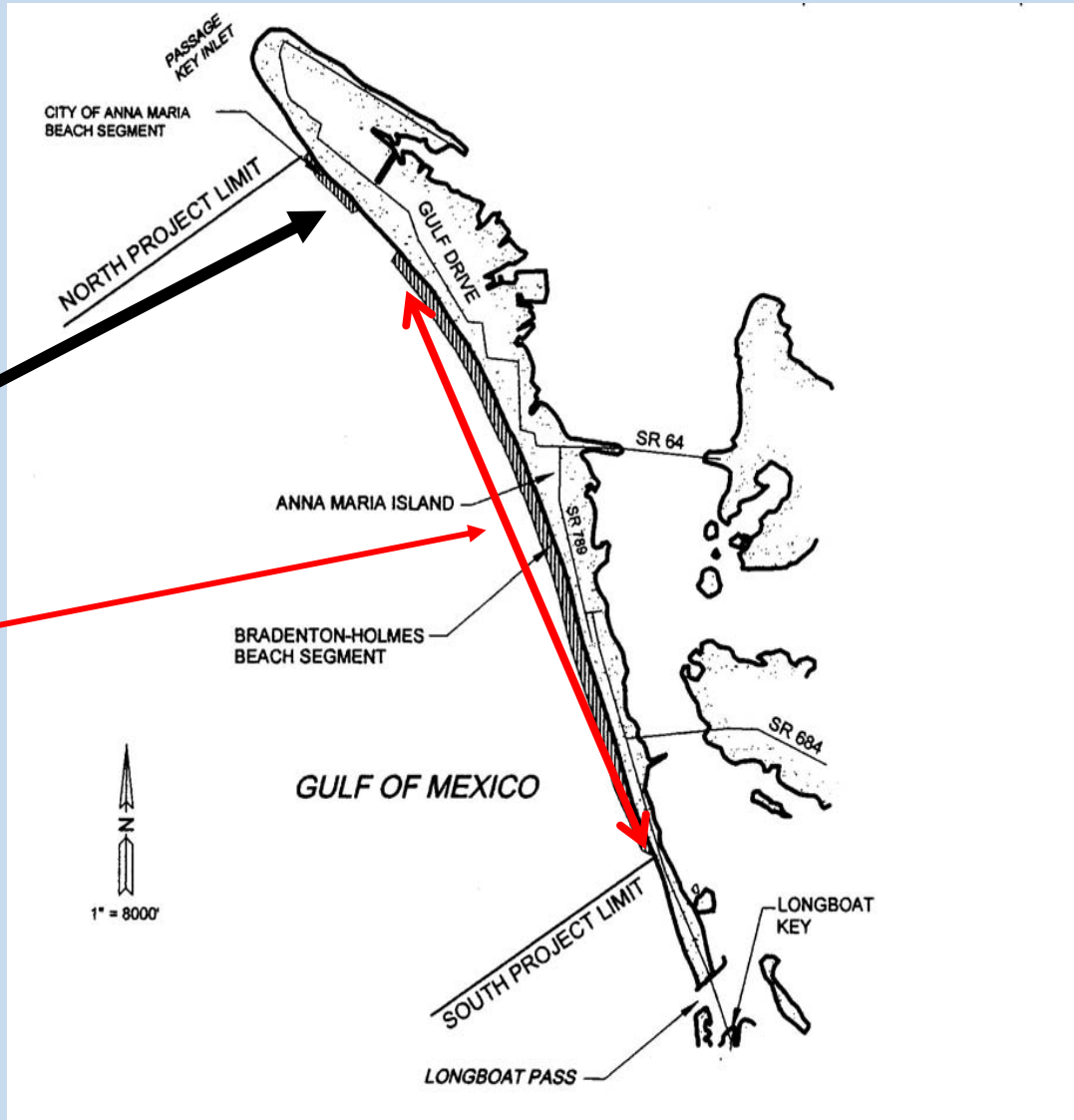
Anna Maria Island, FL
Project Area Location

City of Anna Maria (Non-Federal) Project Limits

Federally Authorized Project limits



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Anna Maria Island, FL
2002 Construction

Anna Maria Island, FL
2002 Construction


Anna Maria Island, FL
2002 Construction

Anna Maria Island, FL

2002 Pre Construction

2002 Post Construction

2002
Anna Maria Island Beach Renourishment Project

Approximately 1.9 million cubic yards of sand was placed along the 4.6 mile project area.

The average berm width extension was 140 feet with a berm elevation of +5 ft. NGVD

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Beach Nourishment Project
Delray Beach, Florida

Delray Beach, Florida

In the early 1960's the erosion was so severe that State Road A1A was partially washed out on several occasions.

The City attempted to protect the roadway by dumping rubble on the erosion embankment during storm events.

This alternative did not provide long term success

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Delray Beach, Florida

In the Late 1960's the City constructed an interlocking waffle block revetment to protect State Road AIA.

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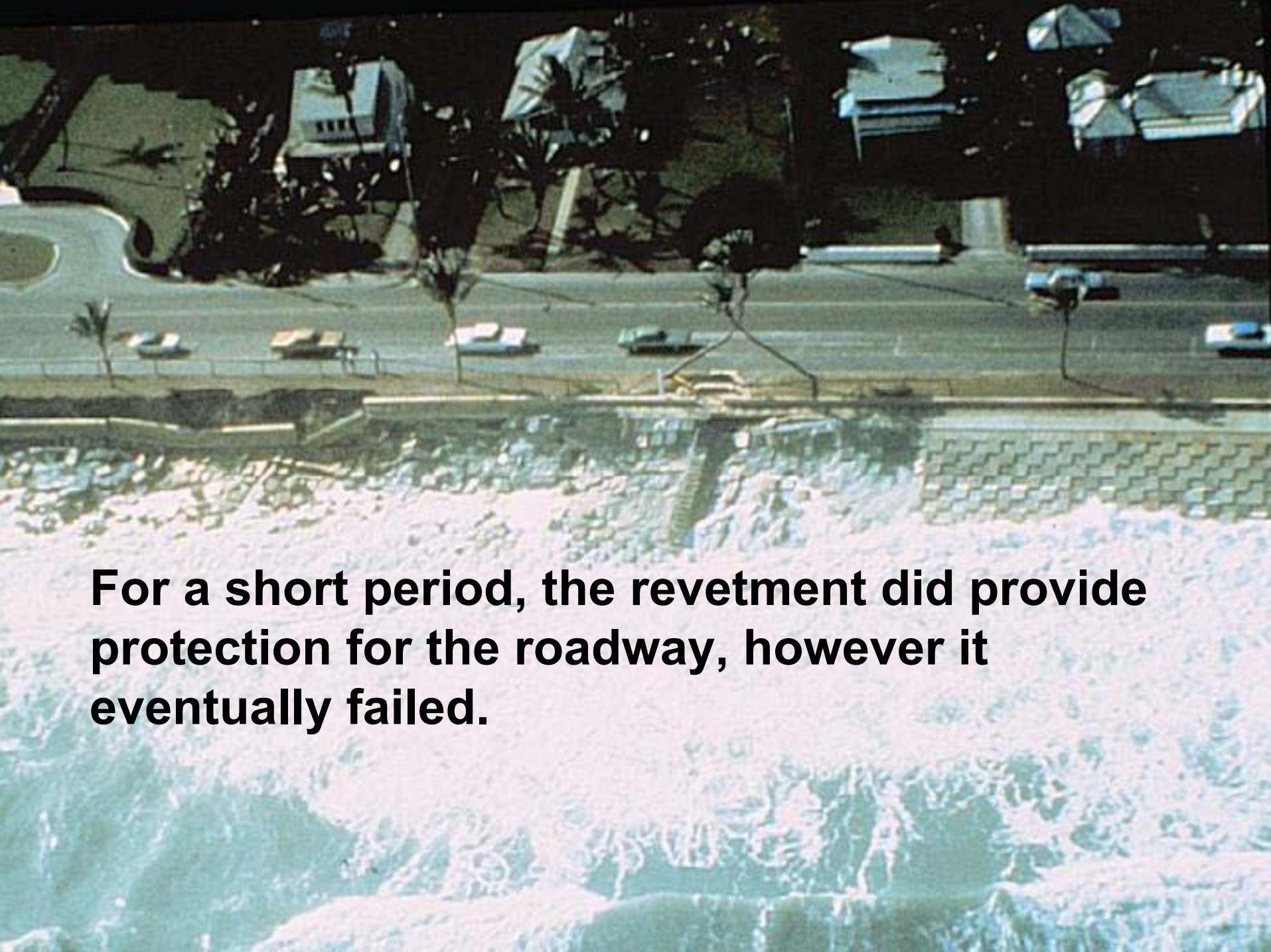

For a short period, the revetment did provide protection for the roadway, however it eventually failed.

Delray Beach, Florida
Beach Erosion

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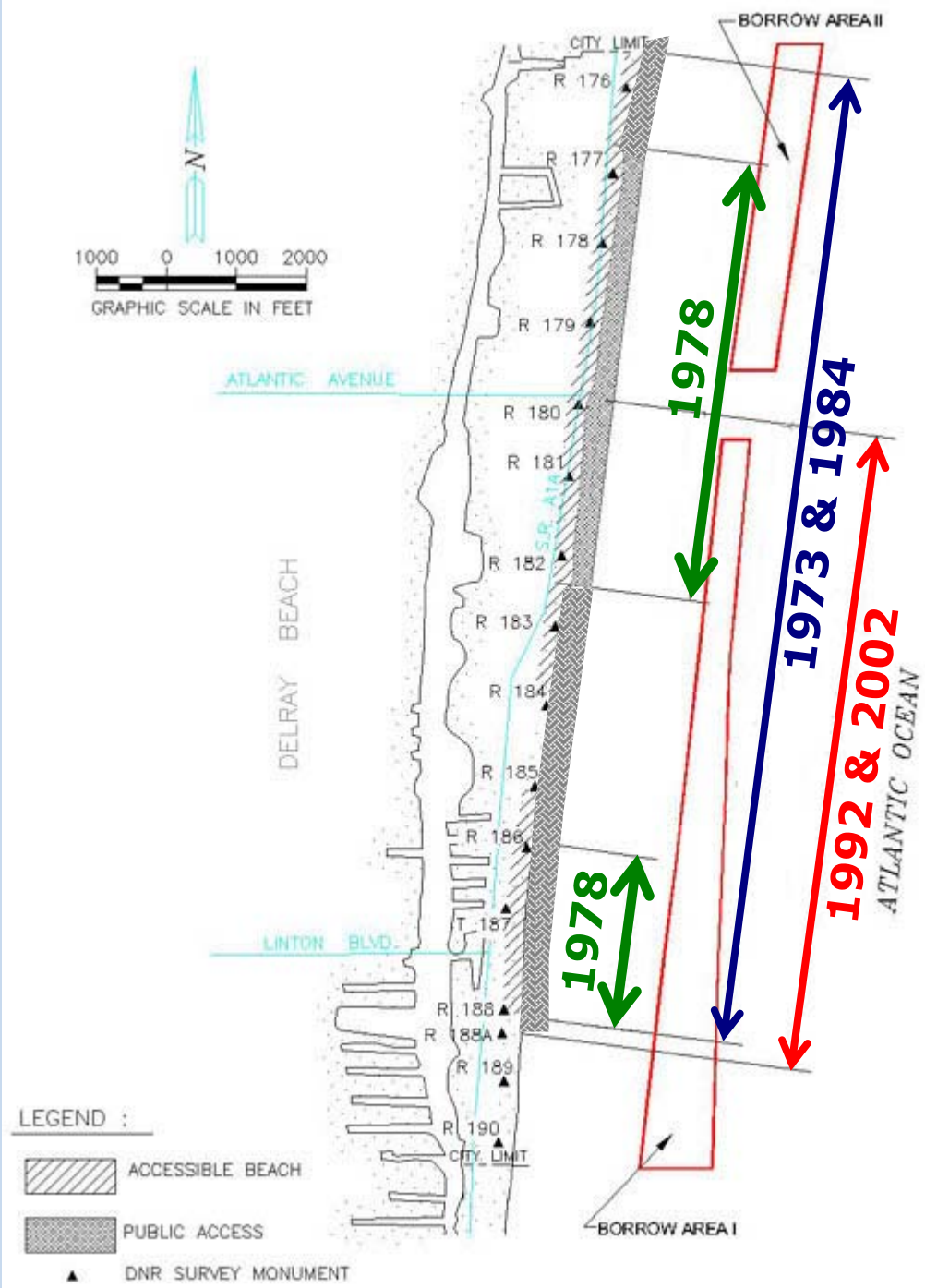
Delray Beach, Florida

Nourishment History Project Location Map



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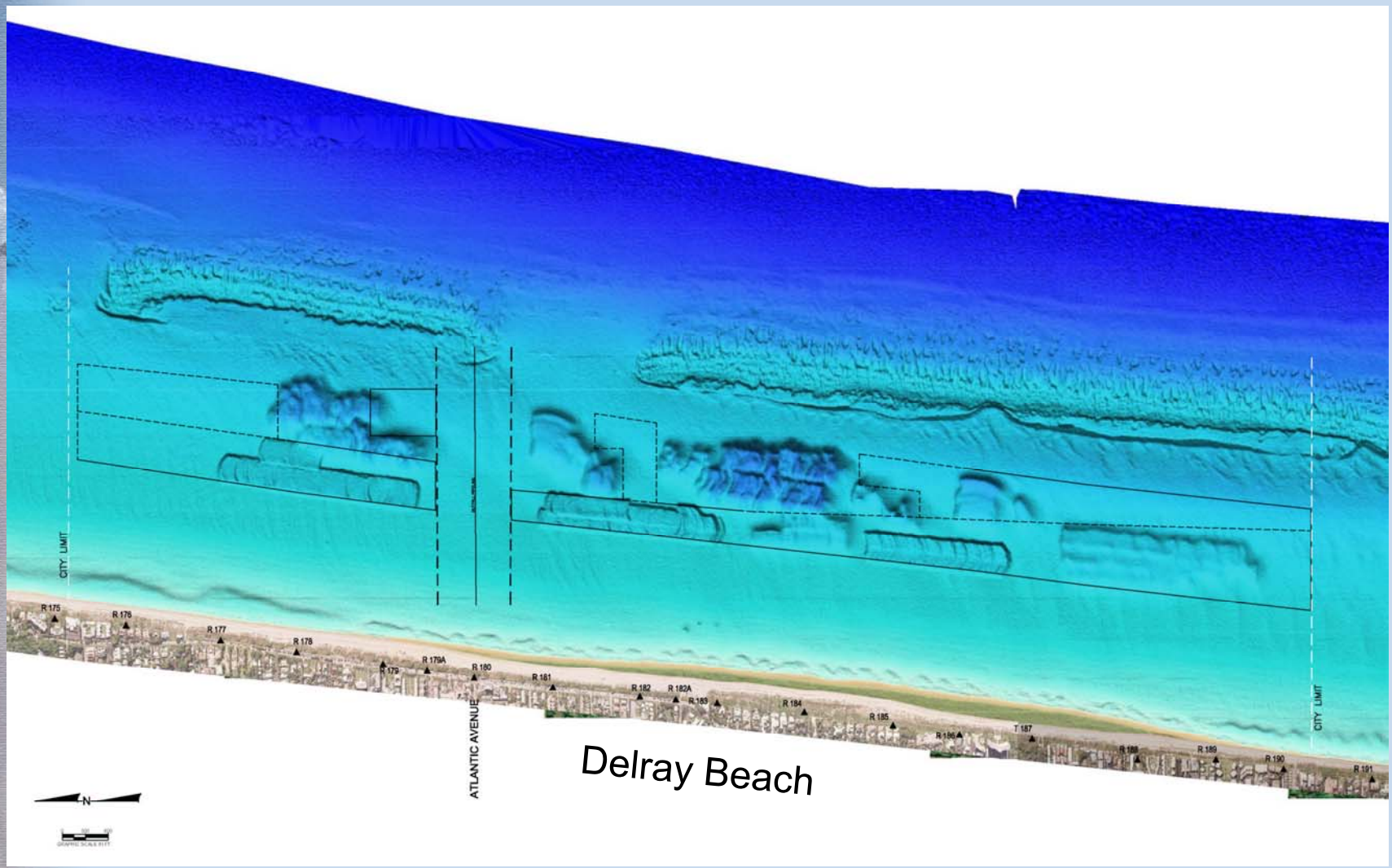
Project – Delray Beach, FL

- Initial nourishment was in 1973
- Approximately 1,635,000 cubic yards of sand were placed along 2.7 miles fronting Delray Beach.
- The project included a dune vegetation component (1974).
- First re-nourishment occurred in 1978 (5-years)
- Second re-nourishment occurred in 1984 (6-years)
- Third re-nourishment occurred in 1992 (8-years)
- Fourth re-nourishment occurred in 2002 (10-years)

Delray Beach, Florida
LADS Survey
Identification of Reef Structure



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Delray Beach, Florida
Prior to Construction

The reef was precisely mapped to allow for careful monitoring of the reef by biologists

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Delray Beach, Florida

Reef structure was protected during project construction

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Delray Beach
1992
Third Periodic Beach Renourishment Project

Construction activities occurred from November through December 1992.

The project area was from Atlantic Avenue (R-180) to 500 feet south of R-188, south of Atlantic Dunes Park.

Approximately 1,230,000 cubic yards of sand were placed over the 1.9 mile project area by Great Lakes Dredge and Dock Company

Dredge Illinois - 1992

Delray Beach
2002
Fourth Periodic Beach Renourishment Project

Construction activities occurred during February and March 2002.

The project area was located from 500 feet north of Atlantic Avenue (R-179A) to 500 feet south of Atlantic Dunes Park (R-188A).

Approximately 1,230,000 cubic yards of sand was placed over the 1.9 mile project area.

The construction contractor was Bean Stuyvesant L.L.C.

Delray Beach, Florida

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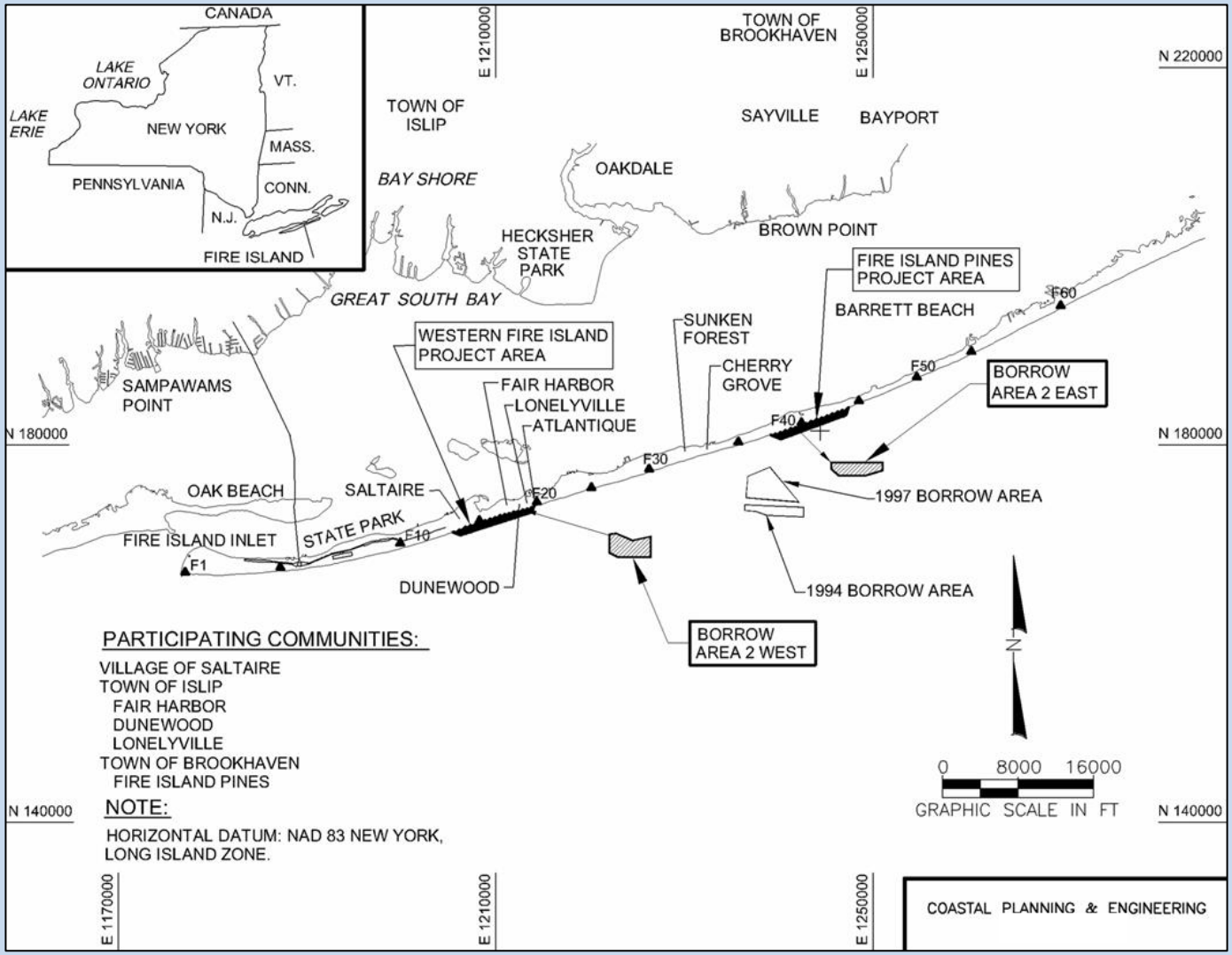
Fire Island, NY
Beach Renourishment Project



Fire Island, NY
Beach Renourishment Project

- Two beachfill segments
  - Western Fire Island Segment and Fire Island Pines Segment
  - Separated by 5 miles
  - Project included five communities
- Beach length = 2.6 miles
- Constructed dune length = 4,400 ft
- Total fill volume = 1.2 million cy
- Construction from November 2003 to January 2004

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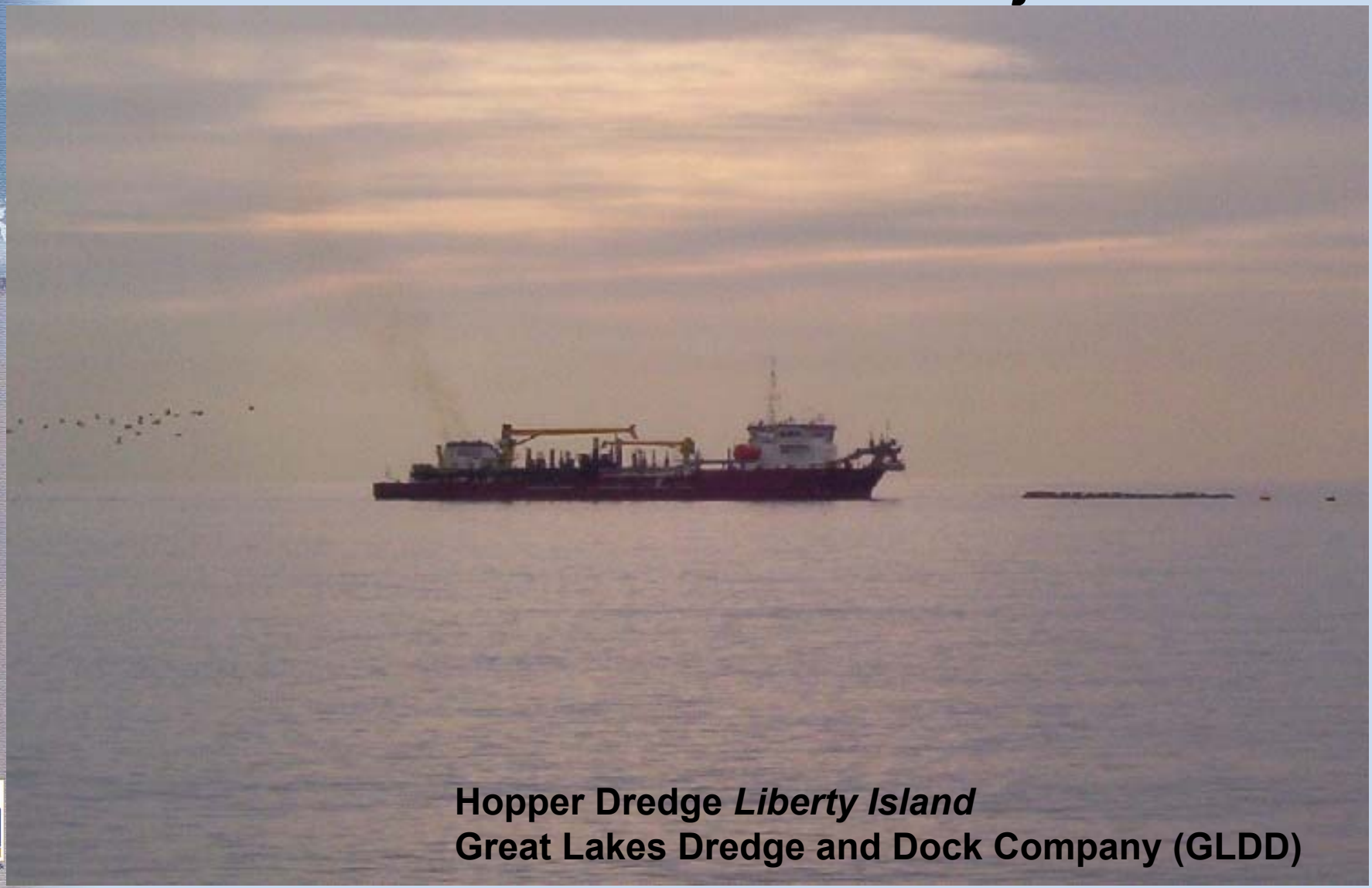
Fire Island, NY
Beach Renourishment Project



Hopper Dredge *Liberty Island*
Great Lakes Dredge and Dock Company (GLDD)

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Fire Island, NY
Beach Renourishment Project

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Fire Island, NY

Hopper Dredge *Liberty Island*

Fire Island, NY
Beach Renourishment Project

Dunewood – Western Fire Island
Pre and Post Construction

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Fire Island, NY
Beach Renourishment Project

Fair Harbor – Western Fire Island
Pre and Post Construction

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Fire Island, NY
Beach Renourishment Project

Heaton
Pre and Post Construction

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Fire Island, NY
Beach Renourishment Project

Saltaire – Western Fire Island
Pre and Post Construction

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Fire Island, NY

Regular summer ferry service and limited winter ferry access is available to many communities.

Some communities are strictly residential, while others provide seasonal or year-round services for the public.

Fire Island Communities

When Fire Island National Seashore was established 40 years ago, its enabling legislation stated that seventeen communities and pre-existing commercial uses would be allowed to remain, as long as construction was consistent with zoning ordinances established by the Secretary of the Interior. Today, these communities thrive within the boundaries of Fire Island National Seashore and contribute to the island's unique qualities. Each community has its own character, providing a great diversity of visitor experiences.

Community Beach Nourishment Projects

After completing an environmental assessment and securing all required local, state and federal permits, the communities of Saltaire, Fair Harbor, Dunewood, Lonelyville, and Fire Island Pines conducted beach nourishment projects on Fire Island during the fall and winter of 2003/04. Beach-compatible sand was dredged more than a mile offshore, then pumped to the beach by submerged and shore pipelines. The western communities widened the beach by about 84 feet on 1.4 miles of shoreline. Fire Island Pines added 78 feet to the entire width of its 1.2-mile beach. Limited dune enhancement was conducted during this year's storm surge protection project. All beach construction work had to be done by January 31.

Photos © Tom Pierro, Coastal Planning & Engineering of NY, P.C.

Photo © Ray Forbes

While artificial dunes lack the efficacy of naturally stabilized dunes, these measures temporarily slow the effects of storm damage and shoreline erosion.

The Special Use Permit requires that conservation measures be implemented before, during and after the projects. Benthic surveys were conducted at the dredge sites to protect sensitive fisheries. As a condition of the permit, the Town of Brookhaven, Town of Islip, and Incorporated Village of Saltaire are required to provide field biologists to conduct endangered species surveys from March 1 through the nesting season.

Symbolic fencing will be installed on a portion of each newly constructed beach.

No pets, kite-flying or beach access permitted at these sites.

To protect suitable breeding and growing areas on this "new" beach, each community will install symbolic fencing (string with orange flagging between fiberglass posts) and construct predator exclosures around plover nests. A 25-foot-wide ORV and emergency response corridor will be maintained. All pets must be leashed on the beach; kite-flying and beach access may be restricted at these sites.

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Bogue Inlet, NC
Inlet Relocation and
Beach Nourishment Project

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Bogue Inlet, NC
2003 Pre-Construction

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Bogue Inlet, NC
Pre-Construction

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Bogue Inlet, NC
Design Parameters

<u>Channel Relocation</u>
- Length: 7,000 ft
- Width: 150-400 ft
- Depths: -12.5 to -21 ft (17 ft average)
- Re-positioned 3,500 ft west of Emerald Isle
- Excavated Volume: 1.04 million CY

<u>Nourishment Project</u>
- Volume: 715,000 CY
- Length: 4.5 miles
- Berm width:125 to 160 ft

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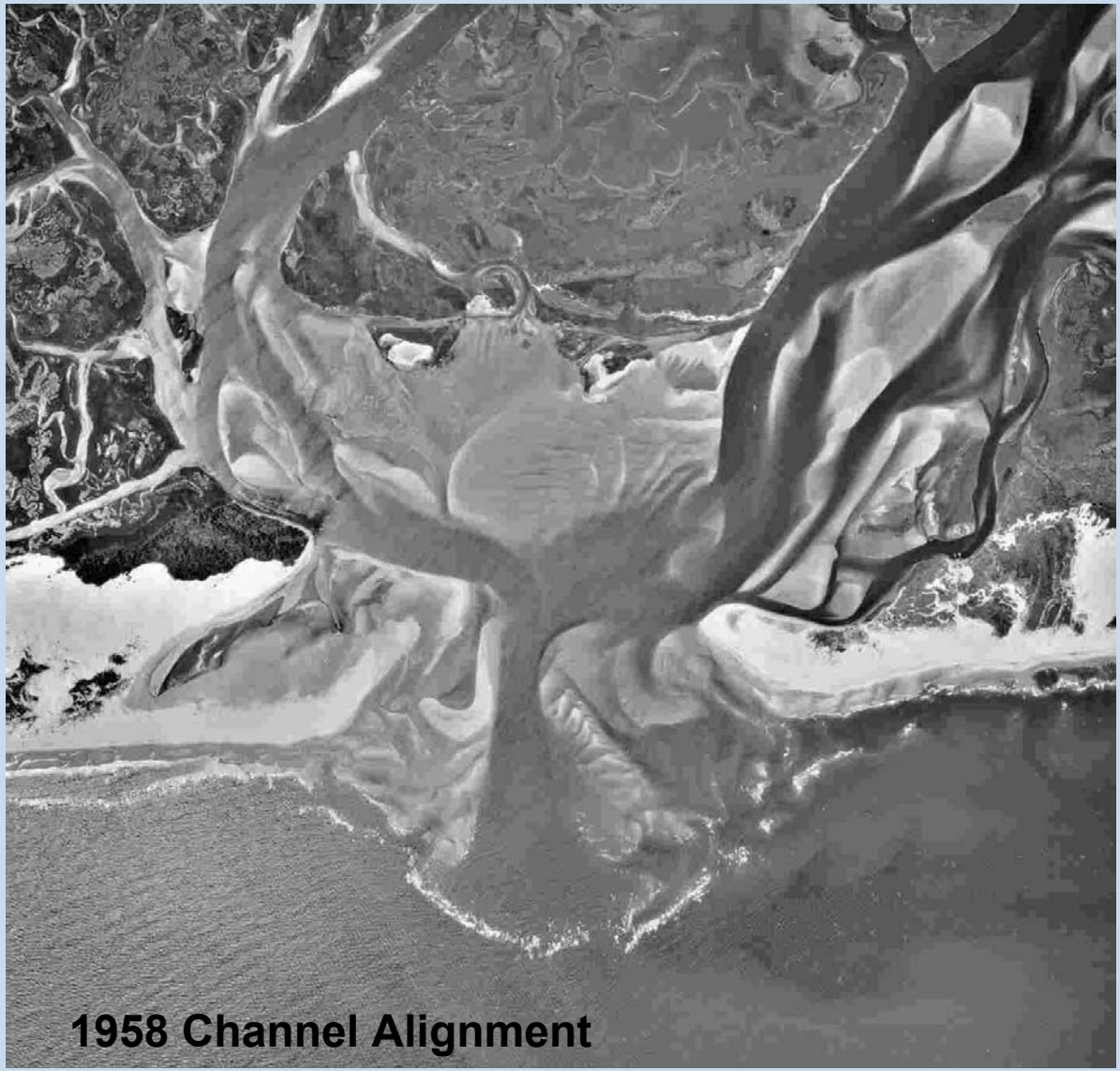
Bogue Inlet, NC



Bogue Inlet, NC

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Bogue Inlet, NC

Pre-Con

Post-Construction

Bogue Inlet, NC
Post-Construction 2005

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Questions?

Thank You!

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